REMARKS

Claims 1 to 4 are pending in the present application. With this Response, Applicant amends claims 1, 3 and 4, and cancels claim 2. Claims 1, 3, and 4 remain pending in the present application.

Objection to the Specification

The Examiner objected to the Abstract because it somewhat repeats claim 1 and is therefore not in a narrative form. Applicant has amended the Abstract in a narrative form to better present the claimed invention to one skilled in the art. Applicant respectfully requests the Examiner to withdraw his objection to the Specification.

§ 101 Rejections

The Examiner rejected claims 1 to 4 under 35 U.S.C. § 101 because they were directed to non-statutory subject matter.

As suggested by the Examiner, Applicant has amended claim 1 to recite (1) the limitations of claim 2 and (2) displaying a pixel on a display device to a user.

Applicant has canceled claim 2, thereby rendering its rejection moot.

As suggested by the Examiner, Applicant has amended claim 3 to recite displaying another pixel on the display device to the user.

As suggested by the Examiner, Applicant has amended claim 4 to recite displaying pixels on a display device to a user.

Accordingly, Applicant respectfully requests the Examiner to withdraw the § 101 rejections of claims 1, 3, and 4.

§§ 112 and 102(b) Rejections

The Examiner rejected claims 1 to 4 under 35 U.S.C. § 112, first paragraph, as failing to comply with the enablement requirement and under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner further rejected claims 1 to 4 under 35 U.S.C. § 102(b) as begin a mental process in a human being augmented by a pencil and paper.

As suggested by the Examiner, Applicant has amended claims 1, 3, and 4 to recite computer-implemented methods. Applicant has further amended claims 1 and 4 to delete the language that the Examiner found confusing.

Applicant has canceled claim 2, thereby rendering its rejection moot.

Accordingly, Applicant respectfully requests the Examiner to withdraw the §§ 112 and 102(b) rejections of claims 1, 3, and 4.

<u>§ 103 Rejections</u>

The Examiner rejected claims 1 to 4 under 35 U.S.C. § 103(a) as unpatentable over a publication entitled "Compositing 3D Images with Antialiasing and Various Shading Effects" ("Nakamae et al.") in view of U.S. Patent No. 5,123,085 ("Wells et al."), and further in view of a publication entitled "Computer Graphics – Principles and Practice" ("Foley et al.").

<u>Claim 1</u>

Addressing claim 1, the Examiner stated:

> --For each edge that touches the bottom border of the first pixel, incrementing a first parameter by a difference between a left fill style and a right fill style of the edge, wherein the leftmost fill style in the scan line is set to null (Nakamae clearly teaches this limitation, as on page 24 where the algorithm is shown, whereby each intersection of an edge with the virtual scanline is processed as recited above.

October 18, 2005 Office Action, p. 9. Applicant respectfully traverses.

P. 24 of Nakamae et al. discloses an anti-aliasing technique for a scanline. In step 1, it reads intersections x_k between faces and a virtual sub-scanline in the scanline. Fig. 3 illustrates an example where a first face has intersections x_1 and x_2 with the sub-scanline in the third pixel, and a second face has an intersection x_3 with the sub-scanline in the fifth pixel and an intersection x_4 with the sub-scanline in the seventh pixel.

In step 2, it determines the weight factors for calculating intensity C'_i of the ith pixel on the sub-scanline. To do this, it first determines if two intersections x_k and x_{k+1} are in the same ith pixel or in different pixels.

If intersections x_k and x_{k+1} are located in the same ith pixel (illustrated with intersections x_1 and x_2 in Fig. 3), then the weight factor for that pixel becomes $(x_{k+1} - x_k)$ and intensity $C'_i = C'_i + (x_{k+1} - x_k)C_k$, where C_k is the intensity of the face containing intersection x_k.

If intersections x_k and x_{k+1} are located in different pixels (illustrated by intersections x_3 and x_4 in Fig. 3), then the weight factor for the pixel containing x_k becomes $([x_{k+1}] + 1 - x_k)$ and intensity $C'_i = C'_i + ([x_{k+1}] + 1 - x_k)C_k$. The weight factor for the pixel containing x_{k+1} becomes $(x_{k+1} - [x_{k+1}])$ and $C'_i = C'_i + (x_{k+1} - [x_{k+1}])\, C_k$. For a pixel between the pixels containing x_k and x_{k+1}, intensity $C'_i = C'_i + C_k$.

In step 3, it determines an intensity C_i of the ith pixel on a scanline as the sum of (1) current C_i and (2) the product of a weight factor d_i and intensity C'_i.

In step 4, it determines if it has processed the last sub-scanline. If not, then it returns to step 1 to process the next sub-scanline.

In step 5, it outputs the current C_i to a display.

In step 6, it resets the parameters and returns to step 1 to process the next scanline.

As described above, Nakamae et al. discloses a method in which intersections between faces and sub-scanlines determine weight factors for calculating the intensities of pixels for anti-aliasing. Nakamae et al. does not disclose, "for each edge that touches the bottom border of the first pixel, incrementing a first fill style parameter by a difference between a right fill style and a left fill style of the edge" as recited by amended claim 1. In fact, Nakamae et al. never mentions fill styles at all.

The Examiner may have confused the weight factor of Nakamae et al. with the "first fill style parameter" recited in amended claim 1. However, the weight factor is <u>a difference between the coordinates of the intersections between a face and a sub-scanline</u> while the recited "first fill style parameter" is "<u>a difference between a right fill style and a left fill style of the edge</u>."

Further addressing claim 1, the Examiner stated:

> However, Nakamae does not precisely detail the filling process)(Wells teaches filling polygons as in Figure 2b, with the pixels having no edges between edges being filled with the color of the polygon as from a first pixel, as in 1:1-2:50 where the Bresenham algorithm for filling polygons is taught, where the left fill style is taken from the right fill style)(Foley clearly teaches on pages 95-96 that the values are incremented as the algorithm moves up the line, just as Bresenham

> suggests, but it keeps the coordinates without rounding them except as needed to make the judgment to which pixel the number should be rounded to, e.g. the rounding is done on the precise value, but the precise value is retained by the system such that once it is incremented, it can be checked again. On pages 95-96 in section 3.6.2 it is taught that slivers present a problem, and suggests on page 96 that a rule such as "draw only pixels that lie interior or on a left or bottom edge" (in this case the case of the bottom pixel is emphasized) would fulfill the recited limitation. Further, on pages 92-94, section 3.6 specifically, the use of a polygon filling algorithm that avoids problems with polygons overwriting each other's pixels is taught an clarified in the context of the Bresenham / midpoint algorithm (pages 96-98).)

October 18, 2005 Office Action, pp. 9 and 10. Applicant respectfully traverses.

Col. 1, line 1 to col. 2, line 50 of Wells et al. only discloses that Bresenham's algorithm and its variations are used for scan conversion (i.e., determining coordinates of pixels on a display which lie closest to a line between vertices of a polygon) and for anti-aliasing (i.e., smoothing the edges of a polygon on a display when pixels do not coincide with the line). Furthermore, Fig. 2b and its description only disclose that inner pixels between edge pixels need to be filled but they offer no details on how to decide what fill style to be used to fill the inner pixels.

> Once the desired partial coverage pixels on the edge of a polygon have been computed, the internal pixels between the polygon edge pixels on a span on a scan line must be filled. <u>Filling a span on a scan line requires determination of the right most edge pixel on the left edge of a polygon and left most edge pixel on the next right edge of the polygon. Once determined, the pixels between these edge pixels are filled</u>. FIG. 2a illustrates why it is necessary to determine the first and last fill pixels in a span since simply using the extreme edge pixels of the polygon on a span would result in adjacent edge pixels being entirely painted as opposed to partially painted i.e. "color* coverage" for edge pixels which are partially covered and simply "color" for fill pixels which are fully painted. FIG. 2b shows an example where only two pixels in the span should be entirely filled since there are five left edge pixels (including one vertex) and two right edge pixels.

Wells et al., col. 3, lines 4 to 20 (emphasis added). Thus, Wells et al. fails to provide any detail as on how to decide what fill style to be used to fill the inner pixels.

As regarding Foley et al., Applicant has previously explained in detail that the cited lines of Foley et al. pertain only to selecting pixels to represent lines and polygons (i.e., scan conversion). Foley et al. does not provide how to decide what fill style to be used to fill the inner pixels.

For all the above reasons, amended claim 1 is patentable over the cited references.

Claim 2

Applicant has canceled claim 2, thereby rendering its rejection moot.

Claims 3 and 4

Claim 3 depends from amended claim 1 and is patentable over the cited references for at least the same reasons as amended claim 1.

Amended claim 4 recites similar language as amended claim 1 and is therefore patentable over the cited references for at least the same reasons as amended claim 1.

Summary

In summary, claims 1 to 4 were pending in the above-identified application. This Response amends claims 1, 3, and 4, and cancels claim 2. For the above reasons, Applicant respectfully requests the allowance of claims 1, 3, and 4. Should the Examiner have any questions, please call the undersigned at (408) 382-0480.

Certification of Facsimile Transmission

I hereby certify that this paper is being facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature   Date 2/6/06

Respectfully submitted,

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